Section II (Remarks)

1. Acknowledgement of Allowable Subject Matter and Response to Claim Objections

In the June 22, 2010 Final Office Action, claims 32, 37, 38, 40, and 46 were indicated to be allowable over the prior art of record in the present application.

Claims 10-17, 22-24, 30, and 31 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Each of the foregoing claims depends (whether directly or indirectly) from claim 1. No amendments have been made herewith to any of claims 10-17, 22-24, 30, and 31.

2. Response to Claim Rejections Under 35 U.S.C. 103

The June 22, 2010 Final Office Action included multiple claim rejections under 35 U.S.C. 103, namely:

- a rejection of claims 1-9, 18-21, 25, 26, 35, 36, and 47 as allegedly being invalid for obviousness over U.S. Patent No. 4,338,281 to Treitinger et al. (hereinafter "Treitinger") in view of U.S. Patent No. 4,019,861 to Dahms (hereinafter, "Dahms") or U.S. Patent No. 7,430,897 to Hu et al. (hereinafter "Hu"); and
- a rejection of claims 27-29 as allegedly being invalid for obviousness over Treitinger in view of "Rico" (assumed to refer to U.S. Patent No. 5,834,627 to Ricco et al. ("Ricco")).

Such rejections are traversed.

a. Law Regarding Obviousness

To support a rejection under 35 U.S.C. 103, **the prior art reference(s) must teach all of the limitations of the claims**. MPEP § 2143.03.

In considering a reference for its effect on patentability, the reference is required to be considered in its entirety, including portions that **teach away** from the invention under

consideration. Simply stated, the prior art must be considered as a whole[1]. "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art[2]." The Federal Circuit and its predecessor court have repeatedly held that **if references taken in combination would produce a 'seemingly inoperative' device, then such references teach away from the combination** and cannot serve as predicates for a *prima facie* case of obviousness[3].

A suggestion to combine references **cannot require substantial reconstruction or redesign** of such references, **or a change in basic operating principles** of a construction of a reference, to arrive at the claimed invention. *In re Ratti*, 270 F.2d 810, 123 USPQ 349, 352 (C.C.P.A. 1959). *See also* MPEP 2143.01 ("If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.')

In *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007), the Supreme Court stated that:

> "A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. … [Rather], it can be **important to identify a reason that would have prompted a person of ordinary skill in the relevant art to combine the [prior art] elements in the manner claimed.**[4]"

---

[1] *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) (emphasis added); MPEP § 2141.02.
[2] *Application of Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve*, 796 F.2d 443, 448 (Fed. Cir. 1986), cert. denied, 484 U.S. 823 (1987).
[3] *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 60 USPQ2d 1001, 1010 (Fed. Cir. 2001); *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999) (proposed combination of references that would be inoperable for intended purpose supports teaching away from combination); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (inoperable modification teaches away); *In re Sponnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244 (C.C.P.A. 1969) (references teach away from combination if combination produces seemingly inoperative device).
[4] See *KSR*, 82 USPQ2d at 1389 (emphasis added).

It is fundamental to a proper rejection of claims under 35 U.S.C. § 103 that an examiner must present a convincing line of reasoning supporting the rejection[5]. The Supreme Court in *KSR* affirmed the validity of such approach, stating that "**there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness**[6]."

Following *KSR*, the Federal Circuit held that although "rigid" application of the "teaching, suggestion, or motivation" ("TSM") test for obviousness is improper, **application of a flexible TSM test remains the primary guarantee against improper "hindsight" analysis**, because a flexibly applied TSM test ensures that the obviousness analysis proceeds on the basis of evidence in existence before time the application was filed, as required by 35 U.S.C. §103. *Ortho-McNeil Pharm. Inc. v. Mylan Labs., Inc.*, 520 F3d 1358, 86 USPQ2d 1196, 1201-02 (Fed. Cir. 2008).

b. Disclosure of Treitinger Relative to Applicants' Claims

Treitinger is directed to a thin film semiconductor gas sensor having an integrated heating element and a metal oxide semiconductor sensor layer, wherein resistance of the semiconductor sensor layer changes in response to the nature and concentration of a detected gas species (e.g., Treitinger, col. 4, lines 52-56). Treitinger's sensing element is a **metal oxide semiconductor sensor layer, not a filament**. At column 3, lines 33-57, Treitinger states:

> The metal oxide **semiconductor layer 6 functions, at elevated temperatures, as a sensor for a select gas in air**, for example, the exemplary SnO_2 layer functions as a sensor for ethyl alcohol vapors in air. Such metal oxide semiconductor layer is preferably about 50 nm thick and can be composed of select metal oxide semiconductors, such as the earlier mentioned tin oxide or platinum oxide or palladium oxide (sensors for carbon monoxide or hydrocarbons, respectively) or tin oxide having additions of niobium, vanadium, titanium and molybdenum (sensors for propane). Two spaced-apart metal contact strips 7 and 8 are vaporized on the sensor layer 6 as shown. Connection wires 9 and 10 are joined to the heating layer 3 via contact strips 4 and 5 and connection wires 11 and 12 are joined to the sensor layer 6 via contact strips 7 and 8. Connection wires 9 and 10 feed a current from a suitable source (not shown) to layer 3 for heating the same and wires 11 and 12 are connected to a **resistance sensor** (not shown) **for determining any changes in electrical resistance in layer 6 upon the presence of a given gas in air**. Preferably, the connection

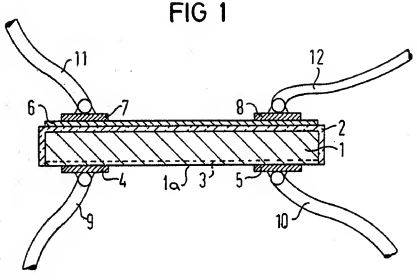
[5] See MPEP 2144 ("*Sources of Rationale Supporting a Rejection Under 35 U.S.C. 103*"), citing *Ex parte Clapp*, 227 USPQ 972 (Bd. Pat. App. & Inter. 1985).
[6] See *KSR*, 82 USPQ2d at 1396 (emphasis added).

wires 9, 10, 11 and 12 have a diameter of about 25 to 100 μm and can be composed of a metal selected from the group consisting of platinum, gold, aluminum and nickel.

Treitinger therefore discloses that the metal oxide semiconductor layer experiences a change in resistance in exposure to a changing concentration of gas, and that the sensed gas may be ethyl alcohol vapor, carbon monoxide, hydrocarbons, or propane.

Figure 1 of Treitinger is reproduced below for ease of reference.

FIG 1



Treitinger's connection wires 9, 10 are joined to a heating layer 3 via contact strips 4 and 5, in order to conduct power to the heating layer. (Treitinger, col. 3, lines 45-51.) Treitinger's "wires 11 and 12 are connected to a resistance sensor (not shown) for determining any changes in electrical resistance in metal oxide semiconductor layer 6 upon the presence of a given gas in air. (Treitinger, col. 3, lines 51-54.) Treitinger discloses that the connection wires 9, 10, 11, 12 have a diameter of about 25 to 100 microns and can be composed of a metal selected from a group consisting of platinum, gold, aluminum, and nickel. (Treitinger, col. 3, lines 54-57.) The metal oxide semiconductor layer 6 is preferably composed of tin oxide, platinum oxide, or palladium oxide (as sensors for carbon monoxide or hydrocarbons, respectively) or tin oxide having added niobium, vanadium, titanium, and molybdenum (as sensors for propane). (Treitinger, col. 3, lines 37-43.)

Treitinger therefore discloses that the resistance of the metal oxide semiconductor layer 6 is sensed in order to determine presence of gas such as carbon monoxide or hydrocarbons, including propane), that connection wires 9- 10 are used for supplying power to a heating layer, and that connection wires 11-12 are used to conduct signals to and from the metal oxide semiconductor layer 6.

Treitinger fundamentally requires a thin film semiconductor layer 6. Nothing in Treitinger discloses or suggests use of any filament as a sensing element. The fact that Treitinger discloses connection wires 9-12 that may comprise platinum, gold, aluminum, or nickel **does NOT embody disclosure of a nickel-containing gas sensing filament**, since Treitinger's connection wires do not have any gas sensing function.

Moreover, nothing in Treitinger discloses or suggests exposure of the connection wires 9-12 to fluoro species, or any detectable change in any property of the connection wires 9-12 upon contact with the target fluoro species, or generation of any output signal indicative of presence of any target fluoro species.

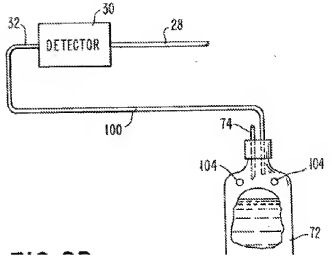
The examiner is requested to recognize Treitinger's connection wires 9-12 as merely providing a signal carrying function (with connection wires 9-10 connected to a heating layer 3, and connection wires 11-12 connected to metal oxide semiconductor layer 6), rather than constituting gas sensing filaments subject to detectable change in at least one property thereof in exposure to fluoro species. As a result, Treitinger fails to disclose any gas sensing filament comprising nickel or nickel alloy, as required by Applicant's independent claims 1 and 35, and the claims depending therefrom.

c. Disclosure of Dahms Relative to Applicants' Claims

Dahms discloses a thermal conductivity detector (also termed a katharometer) containing hot wire filaments of **tungsten or tungsten alloys** (or alternatively, thermistors) for detecting concentration of carbon dioxide gas or chloride gas released from body fluids such as blood,

blood serum, or plasma. (See Dahms, col. 6, lines 33-52 and Abstract.) Figure 2A of Dahms is reproduced below for ease of reference.

FIG. 2A



Nothing in Dahms discloses or suggests the use of any gas sensing filament comprising nickel or nickel alloy, as required by Applicant's independent claims 1 and 35, and the claims depending therefrom.

d. Disclosure of Hu Relative to Applicants' Claims

Hu discloses a gas leak detector including a sensor array 12 of spaced-apart individual sensors 24 formed on a silicon wafer 26, with each sensor 24 comprising a MOS capacitor (i.e., with a thin silicon oxide layer 34, a palladium layer 36, and the silicon wafer 26 constituting the MOS capacitor structure). (See Hu, col. 3, line 56 – col. 4, line 22.) The sensor 24 may be fabricated in a conventional CMOS process, such as thermal oxidation, deposition, and etching. (See Hu, col. 4, lines 20-22.) A wire 40 may be coupled to the palladium layer 36 and a palladium pad 38 to provide a signal to the sensor 24. (See Hu, col. 4, lines 17-18.) Figure 3 of Hu is reproduced below for ease of reference.

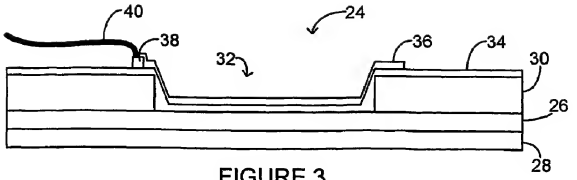


FIGURE 3

Hu is similar in character to Treitinger in disclosing a wire (i.e., wire 40) providing a signal carrying function, rather than a gas sensing function. **Nothing in Hu discloses any "gas sensing filament," *let alone* the use of a gas sensing filament comprising nickel or nickel alloy**, as required by Applicant's independent claims 1 and 35, and the claims depending therefrom.

e. Disclosure of Ricco

Ricco discloses a calorimetric gas sensor that uses a resistively heated, noble metal-coated micromachined polycrystalline silicon filament. Noble metals are widely considered to refer to the following elements: ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, and gold (i.e., the metals of groups VIIb, VIII, and Ib of the second and third transition series of the periodic table)[7]. Nickel is **not** considered to be a noble metal. **Ricco therefore fails to disclose any gas-sensing filament containing nickel or nickel alloy**, as required by Applicant's independent claims 1 and 35, and the claims depending therefrom.

f. The Hypothetical Combination of Treitinger with Dahms, Hu, or Ricco is Not Supported by Articulated Reasoning with Some Rational Underpinning

In KSR, the Supreme Court stated that "**there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness**[8]." In the June 22, 2010 Final Office Action, the examiner alleged that "it would have been obvious to one having

[7] *See, e.g.*, Brittanica Online Encyclopedia, http://www.britannica.com/EBchecked/topic/416979/noble-metal; *see also* Wikipedia.org, http://en.wikipedia.org/wiki/Noble_metal ("The noble metals are considered to be (in order of increasing atomic number) ruthenium, rhodium, palladium, silver, osmium, iridium, platinum, gold.").

[8] See *KSR*, 82 USPQ2d at 1396 (emphasis added).

ordinary skill in the art at the time of the invention to utilize in Treitinger the techniques of Dahms or Hu because both generate an output signal corresponding to the change in the of gas filament in a reliable manner." (June 22, 2010 Office Action, page 3-4.)

It has been previously established herein that each of Treitinger and Hu discloses a gas sensing semiconductor layer (and a connector wire providing signal carrying utility), **not a gas sensing filament**. The examiner's characterization of Treitinger and Hu as disclosing any gas sensing filament is fundamentally incorrect. Due to such error, the examiner's articulated reasoning for combining Treitinger and Hu lacks articulated reasoning with some rational underpinning.

The hypothetical combination of Treitinger and Dahms is similarly unsupportable. While Dahms does disclose a katharometer including a hot wire filament of tungsten or tungsten alloy, such filament is fundamentally different in character from the metal oxide semiconductor layer disclosed by Treitinger. Since Treitinger fails to disclose any gas sensing filament, the examiner's allegation that ""it would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Treitinger the techniques of Dahms … because **both** generate an output signal corresponding to the change in the of gas filament in a reliable manner" is fundamentally incorrect. Due to such error, the examiner's articulated reasoning for combining Treitinger and Hu lacks articulated reasoning with some rational underpinning.

The articulated reasoning supporting the hypothetical combination or Ricco with Treitinger and Dahms or Hu is similarly flawed. The examiner alleged that "it would have been obvious … to utilize Treitinger in view of Dahms or Hu the support of Ricco because the pillars provide conductive pathways between the filaments and the means to resistively heat the filaments to make the above combination more effective." (June 22, 2010 Office Action, page 4.) The foregoing allegation assumes that Treitinger discloses a gas sensing filament, which it does not. Treitinger requires use of a metal oxide semiconductor layer, which is fundamentally different in character from the gas sensing filament disclosed by Ricco. Due to such error, the examiner's articulated reasoning for combining Ricco with Treitinger lacks articulated reasoning with some rational underpinning.

g. The Hypothetical Combination of Treitinger with Dahms or Ricco Would Impermissibly Require Substantial Reconstruction or Redesign of Such References, or a Change in Basic Operating Principles

The hypothetical combination of Treitinger and Dahms is not supportable for the additional reason that the proposed combination would require substantial reconstruction or redesign of such references, or a change in basic operating principles thereof. As indicated previously, Treitinger requires use of a metal oxide semiconductor layer providing detectable change upon exposure to a target gas such as carbon monoxide or hydrocarbons such as ethyl alcohol or propane, whereas Dahms requires use of a tungsten or tungsten alloy gas sensing filament for detecting carbon dioxide or chloride gas. Any modification of Treitinger to utilize a gas sensing filament in place of Treitinger's metal oxide semiconductor layer would entail substantial reconstruction or change in operating principles of such reference, thereby contravening the well-settled that suggestion to combine references **cannot require substantial reconstruction or redesign** of such references, **or a change in basic operating principles** of a construction of a reference. See *In re Ratti*, 270 F.2d 810, 123 USPQ 349, 352 (C.C.P.A. 1959), and MPEP 2143.01. For at least this additional reason, Treitinger and Dahms are not properly combinable to yield the subject matter of Applicants' independent claims 1 and 35, and the claims depending therefrom.

The hypothetical combination of Treitinger and Ricco is not supportable for substantially the reasons. Treitinger requires use of a metal oxide semiconductor layer, whereas Ricco requires use of gas sensing filaments. Any hypothetical combination of Ricco with Treitinger would require substantial reconstruction or redesign of such references, or a change in basic operating principles of a construction of Treitinger.

Based on the foregoing, the hypothetical combinations of Dahms with Treitinger, and Ricco with Treitinger, are unsupportable to yield the subject matter of Applicant's independent claims 1 and 35, and the claims depending therefrom.

g. Even if Combined, Treitinger in View of Dahms, Hu, and/or Ricco Would Not Yield the Subject Matter of Applicants' Claims

It has been previously established herein that Dahms, Hu, and/or Ricco are not properly combinable with Treitinger to yield the subject matter of Applicants' claims. But even if it were proper to yield such references, any proposed combinations of such references would still not yield the subject matter of Applicants' independent claims 1 and 35, and the claims depending therefrom.

Applicants' claim 1 requires (inter alia) a gas sensing filament comprising nickel or nickel alloy.

Treitinger fails to disclose any gas sensing filament, let alone a gas sensing filament comprising nickel or nickel alloy (since Treitinger's connecting wires 9-12 do not constitute gas sensing filaments).

Dahms discloses gas sensing filaments, but such filaments comprise tungsten or tungsten alloy.

Hu fails to disclose any gas sensing filament, let alone a gas sensing filament comprising nickel or nickel alloy.

Ricco discloses gas sensing filaments, but such filaments comprise noble metals, of which nickel is not a member.

It has therefore been established that **none of the references relied upon by the examiner disclose any gas sensing filament comprising nickel or nickel alloy**.

For at least the reason that the hypothetical combination of the cited art would not embody any gas sensing filament comprising nickel or nickel alloy as required by Applicant's independent claims 1 and 35, and the claims depending therefrom, such claims are patentably distinguished over the cited art.

Withdrawal of the rejections of claims 1-9, 18-21, 25-29, 35, 36, and 47 is warranted, and is respectfully requested.

CONCLUSION

Based on the foregoing, all of Applicants' pending claims are patentably distinguished over the art, and in form and condition for allowance. The examiner is requested to favorably consider the foregoing, and to responsively issue a Notice of Allowance. If any issues require further resolution, the examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss same.

Respectfully submitted,

/vincent k. gustafson/
Vincent K. Gustafson
Reg. No. 46,182
Attorney for Applicants

INTELLECTUAL PROPERTY/
TECHNOLOGY LAW
P.O. Box 14329
Research Triangle Park, NC 27709
Phone: (919) 419-9350
Fax: (919) 419-9354
Attorney File No.: 2771-546-CIP2

The USPTO is hereby authorized to charge any deficiency or credit any overpayment of fees properly payable for this document to Deposit Account No. 08-3284